Issued as Sessional Paper No. 10 of 1937.

NIGERIA

IMPERIAL MYCOLOGICAL INSTITUTE
8 NOV. 1937

ANNUAL REPORT

ON THE

Agricultural Department

1935

Printed and Published by the Government Printer, Lagos

To be purchased at the C.M.S. Bookshops, Lagos and Port Harcourt, the S.I.M. Bookshop, Jos, and the Crown Agents for the Colonies, 4 Millbank, London, S.W. 1.

Price: Three Shillings

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2156/36

TABLE OF CONTENTS

	Paragraph.
General Progress	1
Increase of Staff	4
Visit of the Agricultural Adviser to the Secretary of State	5
Locusts	6
Extension of Mixed Farming	7
Cattle Breeding in the Northern Provinces	14
Improvement of Cows	19
Calf Mortality	22
American Cotton in the Northern Provinces	25
Improvement of American Cotton	28
Ginger Production for Export	29
Improvement of Groundnuts	31
Cattle for the Middle Belt	32
Ishan Cotton Production	36
Green Manuring in the Southern Provinces	39
Cultivated Oil Palms	45
Palm Oil Presses	48
Export of Oranges	52
Grapefruit Growing for Export	59
Export of Pineapples	63
Rice Growing in Mangrove Swamps	69
Tapioca and Starch	73
Poultry	75
Co-operative Marketing of Cocoa	76
Produce Inspection	81
	Appendix.
Memorandum on Stock Breeding Policy	I
Memorandum on Measurement of Stock	II
Summary of Agricultural Legislation	III
Expenditure and Revenue	IV

Annual Report on the Agricultural Department, Nigeria, 1935.

General Progress.

1. The more important advances in the extension work of the department in 1935 may be summarised by the following figures of the increases that have occurred during the past year or season, as compared with the corresponding totals at the end of the previous year or season:—In the number of "mixed farmers" in the Northern Provinces 108%; in the export of ginger 72%; in oil palm planting 71%; in the use of palm oil presses 80%. The production of American Cotton for export has remained stationary at 50,000 bales, owing to an unfavourable season; but the increase in production of Improved Ishan Cotton will amount to about 35%. In the newer lines of extension work, such as the planting of selected oil palms, the export of oranges, and the planting of grapefruit, similar figures of relative increase would be very impressive, but they would have no real significance, because the actual figures are as yet very small.

2. When an agricultural department is started in such a country as Nigeria it is inevitable that there should be little tangible economic return from its operations for many years. But after that initial period, it should be possible, if the work is sound and successful, to point to increases in the annual income of the country amounting to something like ten times the nett annual cost of the department; and at the same time to point to an adequate volume of longer range work in progress: that is to probable improvements still in their infancy, which can reasonably be expected to give great returns in the course of time. This position has now been reached in Nigeria. The budget of the department is about £100,000 per annum and its direct revenue (almost entirely in Produce Inspection Fees) is £40,000 to £45,000, so that the nett annual cost is under £60,000. I think that no one connected with the cotton industry will deny that, but for the work of this department in introducing the American Cotton in the Northern Provinces and the Ishan Cotton in the Southern Provinces, the export of cotton in 1935 would have been no more than 8,000 bales at the very most instead of the 58,000 bales actually exported in that year. As each bale is worth about £10, the value of the cotton export ascribable to the department's work is thus at least £500,000. Again it is hard to say quite how bad would have been the position of our cocoa industry to-day if the quality of the product had remained as poor as it was fifteen years ago; but even if the volume of the export had increased as much as it has, it cannot be doubted that, but for the work of this department, the value of the export would have been less than it is to-day by some £3 per ton. That, on a crop of some 77,000 tons, means well over £200,000. So that on these two items only, cotton and cocoa, the annual increase in the wealth of the country, as a result of the department's efforts, amounts to over £700,000 in return for an annual expenditure of £60,000. There are, of course, many other smaller items which should be placed on the credit side of this calculation; as, for instance, that the produce inspection prevents the wasted expenditure that would otherwise result from the annual shipment of some 10,000 tons or more of excess shell in palm kernels. Again the

kolas consumed in Nigeria are now all produced here instead of being imported at a cost of more than half a million sterling, as was the case a few years ago.

3. The many lines of work upon which we are engaged and in which some tangible, though as yet small, result can already be seen, are dealt with hereafter in detail. In addition to these, a considerable amount of long range work is going on which cannot be dealt with in detail in this report. This category of work includes the improvement, by scientific breeding, of oil-palms, cocoa and cassava, stock and scion trials of citrus fruits, work on coffee, and most of the work in field experiments, and in the chemical laboratories, connected with the study of the problems of maintenance and improvement of the fertility of our soils.

Increase of Staff.

4. The arrangement of sharing the cost of agricultural officers engaged in extension work in the Northern Provinces with the Native Administrations concerned, has made it possible to appoint four new officers for that work, making eight new appointments in all during the last fifteen months. Thus, whereas, less than two years ago, it appeared that we should have perforce to withdraw from some of the areas in which we have been working, thereby largely wasting most of what had been done and learnt, we have actually been able, not only to improve our organisation in all our old areas, but also to restart work in the Niger Province, from which we withdrew at the beginning of the depression, and to start in several entirely new areas. An increase of staff has also been approved for 1936-37 in the Southern Provinces, where the continuity of our work has recently often hung upon a hair. Most of the young men recently appointed show great promise, and have got a grasp of their work and settled down to it remarkably quickly. If the recruits who are to come next year prove equally good, the disorganisation in the work of the department, which resulted from the five years of depression, will soon be repaired.

Visit of the Agricultural Adviser to the Secretary of State.

5. Mr. F. A. Stockdale, the Agricultural Adviser to the Secretary of State and head of the Colonial Agricultural Service, made a short visit of inspection in November. His report is not yet available, but certain new schemes, which were under consideration, received his support and are accordingly being prepared for the consideration of Government.

Locusts.

6. Little damage was done by locusts in 1935. At the beginning of the year the infestation was on much the same scale as in the previous year; but by the end of the year it seemed to be decreasing. The entomologist visited Chad in April-May and again in December. He met French entomologists on the former occasion and extended his survey to cover a considerable area of French territory, which was suspected of being possibly an outbreak centre of the Red Locust. In his second visit, he completed his survey of all probable outbreak centres in, or bordering, Nigeria by examining marshes in the south-east of the Bornu Province and in Adamawa. As a result of this work he considers that this part of Chad must be regarded as a potential outbreak centre of the Red Locust; and the continuation of his study of the Migratory Locust in Bornu near Lake Chad, again confirmed his previous conclusion, that it is likely, though it cannot yet be said to be certain, that there is no primary outbreak centre of the Migratory Locust there.

It is therefore considered that, in the interest of many other countries in Africa as well as of Nigeria, an entomologist ought to visit the Chad region from time to time. Once a year is considered to be a reasonable frequency for such visits, in the absence of any indication of danger or of further knowledge than is yet available. The International Locust Committee may possibly also consider that Nigeria should take some share with French West Africa in the duty of regular periodic inspections of the outbreak area of the Migratory Locust in the middle Niger. If that is required of us, I consider that Nigeria ought certainly to accede to the request, just as I considered that it was justifiable for Nigeria to undertake all the original work which established the fact that that area was the source of the recent plague of this locust.

Extension of Mixed Farming.

7. The meaning in which the term mixed farming is used in this department, and the great advantage of the system, have been explained in previous reports. The following tables show the progress from year to year in the extension of this innovation :—

Year.	No. started during the year.	*Failures during the year.	Total continuing at the end of the year.
1928	3	...	3
1929	9	5	7
1930	13	3	17
1931	31	4	44
1932	71	7	108
1933	84	19	173
1934	139	14	298
1935	348	25	621

* "Failures" include all men who give up the system for any cause, including even death, when the heir is not capable or willing to continue the system.

The extent of the progress in the various Emirates in 1935 is shown by the following figures :—

Emirate.	No. at end of 1934.	No. started during the year.	*Failures during the year.	Total continuing at the end of the year.
Zaria	131	118	12	237
Birnin Gwari	...	1	...	1
Kano	15	54	1	68
Kazaure	9	6	1	14
Gumel	7	7	...	14
Hadejia	...	1	...	1
Katsina	71	70	6	135
Daura	16	30	...	46
Sokoto	45	40	5	80
Sokoto (Rice Farmers) ...	...	13	...	13
Argungu	1	...	...	1
Gwandu	3	7	...	10
Kontagora	...	1	...	1
Total	298	348	25	621

* "Failures" include all men who give up the system for any cause, including even death, when the heir is not capable or willing to continue the system.

8. It will be seen that 323 more farmers were using the new system at the end of the year than at the beginning. This compares with an increase of 125 farmers during 1934. The prices realised for groundnuts and cotton this year were reasonable, and the beginners have thus had no difficulty in making the payments that are required of them under the Native Administrations' scheme of repayable advances of capital. Provided that the advances given are no

higher than necessary, and provided that the Native Administration officials do their work properly in keeping the accounts up to date and presenting the demands for repayment at harvest time, then farmers almost invariably pay what is due from them, without the slightest attempt at procrastination or evasion of their debts. After a season that is a very bad one for farmers, either because of low prices or light rainfall, some part of the first year's repayment by beginners may have to be postponed to later years, but this should be an entirely exceptional occurrence. This year many farmers have repaid more than the minimum required of them, generally in order to be allowed to buy iron ploughs.

9. The hiring charges, corresponding to interest on the advances at the rate of five per cent per annum, are used by the Native Administrations to form an insurance fund to cover any losses of bullocks that occur during the period of inoculation and training and to meet a part (generally one half) of the loss incurred by any farmers who, through no fault of their own, have the misfortune to lose one of their bullocks during their first year. The total amount received for hiring charges barely suffices as yet for this purpose in some Emirates; but it is hoped that they will do so in most of them, when considered over a period of years; for the increasing popularity of iron ploughs causes more advances to be taken for their purchase. The same rate of hiring charge applies to these advances as to those for bullocks, but the advancing of ploughs entails no risk.

10. There are as yet but few farmers who have had all their land under cultivation for two or three years and thus have been able to get it all into good heart. Among those, still fewer have had a cow for more than a year and thus obtained increased crops as a result of the manure made by the cow, let alone from that made by young stock. Yet, already, several of the ordinary peasant farmers, who adopted mixed farming three or four years ago, are known to have sold groundnuts and cotton this year to the value of as much as £10. Thus, after feeding themselves, their families and stock, they have this much money at least, as their income for the year, entirely nett except for the payment of tax and the repayment of capital, if they had not already finished paying it back. Only a few years ago, any of them, farming only by manual labour, would have thought himself lucky if in any one season he could sell produce to the value of one pound instead of ten.

11. In the following table, the farmers who have adopted the new system are classified according to their social positions :—

Emirate.	Emirs and N. A. Executive Officials.	Village Heads.	Peasant Farmers.	Others.	Total end 1935 season.
Zaria	19	43	161	14	237
Birnin Gwari ...	...	...	1	...	1
Kano	13	27	24	4	68
Kazaure	5	3	4	2	14
Gumel	5	5	4	...	14
Hadejia	1	...	...	...	1
Katsina	20	61	35	19	135
Daura	6	26	5	9	46
Sokoto	39	19	16	6	80
Sokoto (Rice Farmers)... ...	...	...	2	11	13
Gwandu	9	1	...	...	10
Argungu	1	...	...	...	1
Kontagora ...	1	...	...	...	1
Total ...	119	185	252	65	621

12. The total number of peasant farmers who are working on the new system is really the ultimate measure of our progress in this extension work; and thus the proportion of peasants among those who have taken up mixed farming in any particular area shows the stage of progress that has been reached in that area. Many native officials, and most of those relatively wealthy persons who are classified in the table as " others ", are enthusiastic converts and good farmers; but some of them have only taken it up because it is a correct and fashionable thing to do. Again, in some Emirates, the village heads are, quite truly, peasant farmers, and neither their economic position nor their outlook is affected by the very small salaries which they receive for their part-time official duties; but other village heads, like the district heads everywhere, are primarily officials, and only secondarily farmers. But, in order to avoid any possible exaggeration of the degree of progress that has been attained, only those persons who are unquestionably and strictly peasants and nothing else in addition are classified as such in the table given above. From that table, and from the corresponding ones in previous annual reports, it will be seen that the total number of peasant farmers who were working on the new system was 78 at the end of 1933, 118 at the end of 1934 and 252 at the end of 1935, so that their numbers increased by 51% in 1934 and by 113% in 1935.

13. *Supply of Cows, etc., to Farmers:*

Total number of farmers, 1935	621
,, ,, ,, cows supplied	105
,, ,, ,, iron ploughs supplied	499
,, ,, ,, carts supplied	38

The figures given above show the progress made so far in improving the technical efficiency of the farmers, by showing the numbers of cows, iron ploughs, and carts that have been supplied to them, to the end of the season 1935. Further, about 200 already owned cows or have been able to buy them without assistance; indeed the richer farmers have small herds of cattle. When cows are supplied by Government or the Native Administrations, only one is supplied to each farmer. Many of the cows supplied to farmers were culled from the herds at the Government farms, but some have been purchased by Agricultural Officers on behalf of the Native Administrations and then sold to the farmers. Very nearly all the iron ploughs and carts mentioned below have been supplied on the hire purchase system; but for many of the cows the farmers have paid spot cash. The waiting list for cows in most Emirates is a long one, and by the time a man can get a cow, he has usually been following the new system of farming for three or four years, and is thus able to buy his cow out of profits. There is no doubt that for very many years the farmers' demand for cows will greatly exceed the supply; but we hope gradually to meet a substantial part of the demand, and that eventually the day will come when those farmers who obtain cows from us now will be able to sell their surplus heifers to other farmers.

Cattle Breeding in the Northern Provinces.

14. The general policy governing the cattle breeding work of the department has recently been reviewed and reconsidered; and some modifications have been made therein. To explain these it is necessary to describe briefly the lines upon which we started work some eight years ago. Our objective was then defined as the breeding of the best cattle that could be maintained satisfactorily, given the best feeding and management that could reasonably be expected to be provided by the best mixed farmers . It followed, from this definition of our objective, that there could be no crossing with the blood of European breeds of cattle. For such crossing, whether

advantageous or not in the long run elsewhere in the tropics, would produce cattle that would not be hardy enough for the conditions of any native farms here. But it equally followed that we need not keep our breeding cattle under the extremely rigorous conditions of the ordinary nomad or village herd, in order to avoid losing the physiological adaptations by which these cattle manage to survive in such adverse conditions. The interpretation of " best cattle " was to be the best for the dual purposes of milk from the cows and work from the bullocks. It was anticipated that these two purposes would be found not to be, in any serious degree, conflicting or antagonistic. In pursuit of these objects, it was decided to establish three separate herds, and thus to study and test three out of the five most distinctive types of the local Zebu cattle. It was anticipated that, sooner or later, the number of separate breeds thus maintained by the department would be capable of reduction to two or perhaps even one, according to the results of the experience that would be thus gained.

15. It was inevitable that when the work on cattle breeding was started, the policy by which it was guided had to be based upon impressions and guesses at facts, rather than upon reliable knowledge—which only the work itself could yield. During the seven or eight years which have elapsed since then, our knowledge of the subject has naturally increased very considerably. The effect has been to confirm both the truth of the premises on which our policy was based, and the soundness of the policy itself. The new steps that are now being taken are only the natural further steps in the original direction, which have become possible as a result of our progress so far.

16. We originally decided to establish herds of the *Shuwa* cattle of North-east Bornu, the *White Fulani* of Katsina, Zaria, etc., and of the *Godali*, which is one of the several types of relatively non-nomadic cattle recognisable among the cattle of the Sokoto Province. As compared to the two chief types, left out of the scheme—the *Rahajis* and the *Chad* cattle—the three breeds which we selected may all be described as short-horned Zebus. We have since had enough experience of the long-horned Rahajis to realise that, while the cows of that breed include some fair or even good milkers, the males are very inferior, indeed almost useless, as working animals. Similarly, though there are other types of short-horned Zebus which are fairly distinctive, in addition to those three which we selected, we still believe that none of them would be especially useful for our purpose, though it did appear at one time that the Adar type probably constituted an exception to this statement. The Adar type, though well known and fairly common in certain parts of the Northern Provinces, does not approach so near to an actual breed anywhere within Nigeria, as it apparently does across the border in French territory, to the north of Sokoto, Katsina and Daura. As the type or breed appeared to be one that might prove useful to us, a small herd of these cattle was bought at a place very near the border. They had probably been bred across the border. They have proved to be good cattle for our purpose, but not of outstanding quality in comparison with the Nigerian breeds. It has now been decided to reduce the number of our herds from four to two, and to start to grade the stock of the rejected breeds to the retained ones.

17. Since a record of the reasons for this decision may be of more interest and importance twenty years hence than it is to-day, I give a departmental memorandum dealing with this subject in detail, as Appendix I to this report. Before it was taken, the

decision was long considered, and I think the memorandum can fairly be said to represent the general consensus of opinion in the department, as well as my own views. It will be seen that crossing of the two breeds which have been retained is not contemplated at present. There tends, in work upon both animal and plant improvement, to be two schools of thought, of which one favours the use of selective methods and grading alone, at least until those methods have been followed so far that further progress becomes difficult or very slow : the other school favours experiments in crossing at an early stage in the hope of thus producing the perfect type, which may thereafter be fixed by continued selection. While it would clearly be unwise to attempt to make decisions about the distant future, I am convinced that it would be premature to make any experiments in cross breeding with our cattle at present, or in the near future. It is easy enough, in inspecting any one of our herds, to decide upon most of the typical characters of conformation of the breed; but there are as yet few individuals which can be said to be very closely typical of their breed in all respects. Thus it will need two or three more generations of selective breeding before we can hope to have many animals that are approaching " pure-bred " or " closely typical of their breed " in conformation. Our herds are being kept in conditions which are very different from those of the past, and only the first generation reared under these new conditions is as yet adult. It will be only when we have bred two or three generations in their present environment that we can expect them to show fully the characters of performance and disposition that will be permanently typical of the breed under the new conditions. Until then, at least, it would seem to me to be too early to start any experiments in crossing our two breeds.

18. Another argument against any early crossing of our types is our lack of knowledge of what are the most important, most desirable measurable characteristics in the conformation of a working Zebu bull or bullock. This is a lack which cannot, so far as I know, be filled by drawing on the knowledge of any other countries where such cattle are used. No reliable answers seem to be available to even the most elementary and fundamental questions about this subject. This state of affairs is presumably due to the fact that, in the present stage of the scientific breeding of working cattle, the effect of the differences between breeds and individuals in disposition, and possibly also in constitution, is so great as largely to obscure the effect of differences in conformation. Yet there are great and obvious differences in the conformation of breeds and individual animals of the same breed, that are of such a kind that it would seem inevitable that they must be associated with corresponding differences in the value of the breeds and individuals for draft. An effort is therefore being made to reduce the more salient characters in the shape of cattle to measurable figures and ratios and to study the correlation between those ratios and the utility of the animals for draft. In the hope that some of those in charge of herds of working Zebu oxen in other countries may study their animals in the same way, full details of the measurements and ratios in use here are given in Appendix II at the end of this report.

Improvement of Cows.

19. The table given below indicates the improvement that has been effected in the milk yields of the cows in the three herds at Samaru and Shika. In this table the average number of days " between calves " is the average length of time between one occasion when a cow calved and the next occasion. Thus the

figures given for any particular year only include the data relating to the last lactations of all those cows in the herd which calved, for a second or subsequent time, during that calendar year. The figures in the column headed " number of complete lactations " shows the total number of sets of data of this kind that are available in respect of the particular year in question. In a herd of any considerable size, the average yield of milk " per cow, per day between calves " for any particular year corresponds quite closely with the average yield per day during that year of all cows in the herd, including those in milk and those that are dry. The former figure is found, however, to be more suitable for our particular purpose, for both theoretical and practical reasons.

Year.	Number of complete lactations.	Average period between calves—days.	Average number of days in milk.	Average yield per day between calves—Pounds per day.
		Shuwa Herd.		
1929	11	419	250	4·78
1930	16	413	264	3·71
1931	10	398	198	3·63
1932*	15	404	250	4·85
1933	26	471	250	4·35
1934	40	410	290	5·08
1935	45	389	296	5·86
		White Fulani Herd.		
1930	3	391	168	2·02
1931	10	371	172	3·97
1932	18	492	230	3·52
1933	45	427	213	3·79
1934	42	406	261	4·76
1935	47	363	278	6·52
		Gudali (Sokoto) Herd.		
1933	3	—	—	2·42
1934	11	541	288	3·81
1935	17	368	243	6·32

* A number of Shuwa cows was purchased and added to the herd in 1932.

20. It will be seen that there has been a satisfactory rise in 1935 in the average yield per day between calves in all three herds; and figures already available indicate that this will be continued in 1936. From the figures of " average period between calves ", it will be seen that the cows are now calving at intervals averaging very little more than a year, actually two days less than a year in the case of the white Fulani herd in 1935. Annual calving is regarded as the standard in herds of cattle in temperate countries, but it is a standard that is not always attained. It is much more difficult to attain this standard in Zebu herds especially when, as is the case with our herds, the bulls cannot be allowed to run with the cows. For in Zebu herds the oestrus period is extremely short and its signs slight.

21. We have not yet attained the position of being able to give our cows, with complete continuity throughout the year, a diet which is sufficiently rich in protein and which also includes some succulent and highly palatable fodder. The feeding of sweet potatoes, both vines and tops, greatly improved the diet of our cows this season during the earlier part of the dry weather, and we hope eventually to find a means of improving it also in the later weeks of the dry season, by the use of spineless cactus, cassava leaves or sugar cane for fodder, and possibly by using pigeon peas as a nitrogenous concentrate. No effort is being spared to solve this problem, for we feel that it is one that will become as important for the mixed

farmer in the future as it is for us to-day. Incidentally, it will also be a matter of great importance if dairy farms are ever to be established in this country to supply the bigger civil stations, as they have been in many colonies.

Calf Mortality.

22. The second column in the table below shows the total of all abortions, still births and deaths of calves at Samaru expressed as a percentage of the total number of births and abortions in the herd. The third column gives the actual deaths of calves that were born alive expressed as a percentage of the number of live births, including premature live births. Thus in calculating the figures in the second column an abortion or still birth is reckoned as an instance both of a birth and of a death; but in calculating the figures in the third column no account is taken at all of abortions and still births. The calendar year is used in the calculation of these statistics, and calves are regarded as such until they reach the age of six months.

Calf Mortality Statistics.

Year.	At Samaru Farm.		At Shika Farm.	
	For all births and abortions—per cent.	For live births only—per cent.	For all births and abortions—per cent.	For live births only—per cent.
1927	17	17	...	...
1928	21	15	...	...
1929	30	30	...	...
1930	30	26	...	...
1931	44	38	52	48
1932	49	41	46	41
1933	23	16	36	34
1934	29	23	13	10·5
1935	18	8·2	11	6·9

23. The percentage mortality among the calves actually born alive at Samaru in 1935 (*see* third column in the table) would have been still lower, had not three calves been poisoned by being given an overdose of medicine. The figures for losses of calves from all causes at Samaru in 1934 and 1935 (the second column in the table) are influenced by the contagious abortion mentioned in last year's report. The veterinary department has given us every assistance in the attempt to cope with this disease. A dead culture vaccine was prepared locally by that department, and in June all female stock at Samaru received triple inoculations with it. This measure seems to have been temporarily quite effective, but the immunity conferred did not last long. From July to October inclusive there were no abortions at all, but four occurred between December 1st and the end of February. At the Shika farm, the calf mortality is still not so low as we hope it will be eventually; for the system of calf rearing and the housing of the calves is still being steadily improved.

24. It might appear that in doing every thing possible for the calves' health during the first six months of their lives, we are diverging from the policy, mentioned in a previous paragraph, of keeping our cattle in conditions as good as, but no better than, a good mixed farmer could provide. We hope, however, that this is not the case. The three troubles in calf rearing here are intestinal worms, contagious scour and pneumonia. For the two first-mentioned troubles, the more important measures which are taken

on our farms, and the most troublesome, are measures to prevent contagion. But farmers, getting only one calf at a time, will have much less trouble than there is at our farms from either worms or scour, since their one calf is already isolated. The pneumonia seems to be generally a secondary trouble which occurs only during cold weather and only when a calf is already weakened by one of the other troubles. In any event, the only possible measure of prevention or cure of pneumonia is to keep the calf warm during the cold nights and early mornings of the harmattan season. With only one calf to look after, the farmer can, and will, pamper it more than we do. It is thus highly debatable whether, with all our care and medicines, we really give our many calves more favourable conditions than a farmer would give his single calf. Admittedly we treat calves much better than do the Fulani cattle owners; and the result of this is apparent both in our lesser calf mortality and in the difference in appearance of our calves and theirs. In any event, neither the improvement of cattle nor the supply of surplus stock to farmers will be feasible unless we can rear most of our calves to the age of six months. It is also questionable if the maintenance of hardiness by selection of the fittest, would be furthered by allowing calves to die, for there is probably little connection between inherent hardiness and the evasion of the diseases of the early months of life.

American Cotton in the Northern Provinces.

25. Purchases of American Seed Cotton for export expressed as Bales of Lint, each 400 lb. nett.

	Seed distributed.	Cotton bought.	Price paid per lb. of seed-cotton.
	Tons.	Bales.	
1925–26	2,990	37,356	$2\frac{1}{2}$d.
1926–27	3,372	16,659	$1\frac{1}{6}$d.–$1\frac{3}{4}$d.
1927–28	2,220	16,316	$2\frac{3}{8}$d.–$2\frac{1}{8}$d.
1928–29	2,640	24,686	$2\frac{1}{4}$d.–$2\frac{1}{8}$d.
1929–30	3,173	34,389	1·6d.–1·2d.
1930–31	2,719	13,849	·5d.–·8d.
1931–32	1,569	4,811	·6d.–·8d.
1932–33	1,674	22,228	·8d., ·9d., ·8d.
1933–34	2,376	23,013	·8d.–1·2d.
1934–35	3,807	50,022	1·1d.–1·5d.
1935–36	5,170	49,911*	1·1d.–1·5d.

*Approximate to March 31st, 1936.

26. The purchases last season to March 31st amounted, by similar calculations to those used this year, to the equivalent of 49,444 bales, so it is clear that the final figure this year will again be only just over 50,000 bales. This result is disappointing in view of the increased quantity of seed taken for planting in 1935. There is no question that the yield per acre this year was less in most districts than it was last year, because of the fact that the rains ceased unusually early this year. Although the range of prices this year was the same as last, the average price was undoubtedly higher this year by quite two-tenths of a penny. There is every indication that a large area of cotton will be planted again next year.

27. The new marketing system which was brought into operation by the Cotton Marketing Regulations of 1935, proved very satisfactory from the point of view of enabling the cotton to be properly graded. A secondary object of the reform was to prevent

various undesirable practices which result in the buying agents defrauding the seller of the full value of his produce. From this point of view also, the new system was a great improvement upon the previous arrangements, but there is still room for further improvement in this respect, and it is hoped to effect if by the introduction of a few minor, but important, amendments of the regulations.

Improvement of American Cotton.

28. It was explained in last year's report that the Botanist at Samaru had succeeded in isolating a variety (D31) which seemed to give a much heavier yield of seed cotton than the ordinary mixture which we grow at present, and to have a high ginning percentage. But the first spinning trial had suggested that the yarn made from this cotton was possibly weaker than that made from the ordinary lint. Further tests have confirmed all these facts. In a considerable number of trials on our farms the D31 has so far consistently yielded from 10% to 30% more seed cotton to the acre than the ordinary mixture, while the difference in ginning percentage raises this superiority of the D31, in yield of lint per acre, to 15% to 40% in all. But last year's spinning trial again showed that the yarn of the D31 was weak. This weakness was not anticipated from the appearance of the lint: even the experts at the Shirley Institute and the members of the spinning trial committee were surprised by its weakness under test. Now it is just possible that the yield trials carried out so far on our farms may, by chance, give a sligthly exaggerated impression of the increased crop of lint that would result from the general substitution of D31 for the general mixture as grown at present. But that increase could hardly be less than 25% on the average of all fields. Making full allowance for the weakness of the yarn of D31, the real economic value of the lint of that variety is certainly not 25% less than the ordinary lint: so that if the lint could be sold at its true value, the introduction of this variety would almost certainly be highly advantageous to the grower and to the country generally. But unfortunately, since the weakness of the yarn made from this cotton cannot be anticipated from an inspection of the lint, it would sell at first at a price well above its true commercial value. The spinners would therefore eventually be disappointed with their purchases, and it is to be feared that Northern Nigerian cotton in general would thus get a bad name. Our technical advisers in England attach so much importance to this point that they advise against the introduction of this variety, in spite of its good yield. It is thus, as yet, not easy to decide what it is best to do. For the present, we are continuing with yield trials of this variety in order to have very full and reliable data on that point before reaching a decision, and also in order to form as reliable an estimate as possible of the true commercial value of the cotton. The Botanist has also made, and is multiplying, some selections from the original D31 (which was not a perfectly pure strain). One of these (E31) is hardy, and in four small yield trials in two years has given from 14-40% more lint per acre than the ordinary mixture. Should it prove satisfactory in further field tests for yield, and in the spinning tests to which it is now being subjected, it may well solve all difficulties. But that seems almost too much to hope for, and moreover the testing and multiplication would entail a delay of some years, so that it is probable that a decision about D31 will have to be taken soon. No time has been wasted yet, for it is clear that in a matter of such difficulty and importance, it is essential to have data covering trials on a field scale at several centres each year for at least three years before a decision is made.

Ginger Production for Export.

29. The following figures show the progress of our efforts in recent years to stimulate the production, in the Southern parts of the Zaria and Plateau Provinces, of peeled, sunbleached ginger for export :—

1930-31	... 15 tons.	1933-34	... 86 tons.
1931-32	... 39 tons.	1934-35	... 221 tons.
1932-33	... 53 tons.	1935-36	... 378 tons.

The grading of the crop in the last three years has been as follows, expressed as percentages of the whole :—

Grade.	*1933-34.*	*1934-35.*	*1935-36.*
2	2	5	2
3	92	77	64
4	5	17	33

It will be seen that there has been a vey satisfactory increase in the total amount of ginger purchased for export, but that a much larger proportion than previously had to be graded in the lowest class. This is partly because the new growers each year tend always to produce ginger of a poor grade; but many old growers have this year also produced fourth grade ginger, because of the exhaustion of the small pieces of land which they have used year after year for this crop. It is believed, however, that the growers are at last beginning to realise the necessity of using either new land or manured land, and that an improvement in the grade of the crop will therefore occur during the next year or two. Active propaganda in this sense is being conducted.

30. The prices paid this season and in the previous season were as follows in pence per pound :—

Grade.	*1934-35.*	*1935-36.*
II	$3\frac{1}{2}$	$3\frac{1}{2}$
III	$2\frac{5}{8}$	3
IV	$1\frac{1}{2}$	$1\frac{1}{2}$

This year, for the first time, three firms competed in buying ginger. Central markets were therefore established at advertised times and places, and the ginger was graded as the sellers took it into the market. The firms all offered the same price and agreed to instruct their agents not to buy elsewhere than at the markets. The growers also were instructed not to sell ginger anywhere else than at the markets. These instructions were, on the whole, loyally followed by all concerned, and an effective system of grading and marketing was thus instituted, although we had no legal power to enforce such a system. Regulations to govern the inspection and marketing of this crop will be needed at an early date : for unless the quality were reliable, the ginger could not be sold in England at the high prices which it commands at present, and unrestricted buying would soon result in a deterioration of the standard of quality of the crop, and thus to the loss of the trade.

Improvement of Groundnuts.

31. A new variety of upright (" bunch ") groundnut, originally obtained by the botanists from local nuts as a single plant selection, to which the name " Castle Cary " was given, has become extremely popular with mixed farmers. This popularity is due chiefly to the greater ease with which this variety can be weeded and harvested, and to its increased yield of hay, rather than to its superiority in yield of nuts. In twenty-three trials against various ordinary local mixed strains, during five years and at seven different places, the new pure strain has proved superior in eighteen trials, and slightly inferior in the remainder.

The average superiority of the new variety in yield of nuts in all these trials is over 16%; but farmers can hardly appreciate the existence of such a small average increase in yield, and we have therefore never promised them a greater yield from the new variety. The seed has been distributed by sale or exchange, at a premium which is generally about 25%. The oil content of the kernels of the new variety and of local varieties was very fully investigated in 1932, 1933, 1934 and 1935 by analyses of the kernels, yielded by all the field trials in these years. The results show that the new variety is consistently very slightly superior in oil content to the ordinary nuts, when both are grown under exactly the same conditions. Thus in 1935 the new variety was tested on four farms against local seed derived from two separate sources. The results were as follows, expressed as percentage of oil in the dry matter in the kernels :—

	At Sokoto.	*Kano.*	*Gusau.*	*Samaru.*
Castle Cary ...	48.0	51.9	51.8	49.5
Sokoto seed ...	47.8	51.8	—	47.8
Gusau seed ...	—	51.4	50.4	47.2

The variation from place to place is appreciably greater than between the crops from different seed at the same place, but at each place the new variety was very slightly the richer in oil content.

Cattle for the Middle Belt.

32. Continuous work since 1912 in the Ilorin Province has failed to produce any important progress in extension work. It might therefore have seemed natural for us to withdraw from that province when the depression entailed reduction of staff. But the experimental farm was maintained and work continued on a small scale with financial assistance from the Native Administration, solely in the hope of eventually evolving a system of mixed farming suitable for that province and for similar areas in the middle belt of Nigeria, that is, very roughly, in the portion of the Northern Provinces to the South of 10° North latitude. With this object in view we recently (*see* Annual Report, 1935, paragraphs 29-31) imported, again at the expense of the Native Administration, a herd of humpless " West African Shorthorn " cattle from the Northern Territories of the Gold Coast. If they proved tolerant of trypanosome infection here in Nigeria, then it was intended to try to find the best cross between them and zebu cattle for our purpose, and to try to fix it as a permanent breed. It was known that bulls of this breed were regularly used in carts at Pong Tamale, and they were said to be used regularly for ploughing at some French experimental farms. The cattle proved to be about six or seven inches taller on the average than our Nigerian Dwarfs. The smallest of West African Shorthorns, judging by those we have imported, is apparently a little bigger than the very largest, quite exceptional, Nigerian dwarf. The imported cattle were clearly of much better conformation than our dwarfs, though they are not completely free of the dwarf characteristics. We knew from experience at Yandev that dwarf bulls are not big enough to make it practical to use them for draft animals in cultivating any ordinary soil. At first sight it hardly appeared possible that the superior conformation of the West African Shorthorns from the Gold Coast could make so much difference as to make them really satisfactory draft oxen : it seemed possible that the reports we had received of their value in cultivation might be largely due to their being used to cultivate very light soil.

33. Only five bulls were obtained from the Gold Coast and one died soon after arrival. One pair of bulls has been worked with gradually increasing regularity and severity, and has now, for some eight months or so, been worked harder than the ordinary mixed farmer would need to work his cattle. They work slowly, but very steadily and willingly. Occasional rises of temperature have occurred, and trypanosomes have been found in blood-smears taken from these bulls, but they have maintained excellent condition on a modest diet. There seems to be no doubt whatever that a pair of these cattle can plough or cultivate any ordinary soil here, and very little doubt that they are entirely tolerant of infection by local trypanosomes even when in constant hard work. Their superiority as workers over the Nigerian dwarf cattle is very great. It would seem to be ascribable rather to their superior conformation than to their greater size or to any superiority in disposition.

34. In view of these facts it seemed wise to discontinue the highly experimental attempt to find the best cross bred (zebu-humpless) animal for our purpose—an attempt which at best could provide only a compromise which could not be expected to be completely satisfactory. The right policy now seems clearly to be to import a much larger herd of West African Shorthorns from the Gold Coast or the Gambia, to multiply them locally, and to work out the details of a system of mixed farming based on the use of these cattle, by similar methods to those which have proved successful in the North. To progress at any reasonable rate it would be necessary to establish a stock farm for these cattle on a fairly considerable scale. For both in Nigeria and the Gold Coast, and therefore probably throughout West Africa, the native owners of humpless cattle are very reluctant to sell any male animals. In most districts the males are all eaten long before they are full grown, and the fact that they are needed for religious feasts makes it difficult to buy even young males. It is thus out of the question for more than a few pioneer mixed farmers to be supplied with imported pure-bred humpless working bulls. Extension work can only begin when locally bred West African Shorthorns become available. Such a delay is not so objectionable as it might appear at first sight, since it allows us an interval of say five years in which to work out all the many details which must go to make up the middle-belt system of mixed farming—a system which, we can already see, must differ in many important details from that of the North. All this is long range work, which will not give any important economic return for a number of years; but when success is achieved it will be applicable in several other provinces as well as in Ilorin. Schemes are at present under discussion designed in the first place to provide necessary data as to the tolerance of the beasts it is proposed to utilise and to test their suitability and physical capacity in varying conditions with a view to expansion and the establishment later of a stock farm on a large scale.

35. For Government thus to undertake not only to work out and demonstrate a system of mixed farming, but also to provide a stock farm from which all the stock required for the system must come at first, is a considerable undertaking, and it is useless to begin it unless the work can be expected to be carried on steadily through the many years that must elapse before it begins to produce considerable economic results. But we have enough knowledge and experience about this subject, gained at Ilorin and at Yandev in the Benue Province, to be confident of an eventual success comparable to that which has been achieved in the North; and also to know that, in the exceedingly difficult conditions of this belt,

with its relatively sparse population and unsuitability for permanent crops, mixed farming offers the only real hope of any very considerable economic development. The work will constitute a form of long term investment; but there is every reason to hope that it will prove a very good investment in the long run.

Ishan Cotton Production.

36. The 1934-35 cotton crop in the Southern Provinces was heavier than any recorded since 1930. Figures are shown in the table below in comparison with those for the previous five years.

	Native Cotton.		Improved Ishan.	
	Bales of 400 lbs. lint.	Prices.	Bales of 400 lbs. lint.	Prices.
1929–30	3,510	1¼d. falling to ⅝d. (2)	6,026	1⅜d. falling to ⅞d. (1)
1930–31	312	⅝d. falling to ⅜d. (2)	4,289	¾d. falling to ⅜d. (1)
1931–32	4	¼d. falling to ⅛d. (3)	1,333	½d. falling to ⅜d. (3)
1932–33	4	Not quoted	860	9/16d. falling to ⅜d. (3)
1933–34	118	⅝d. (3)	2,884	¾d. (3)
1934–35	389	⅝d. (3)	5,208	13/16d. falling to ¾d. (3)

The present crop (1936), graded during February and March, has already passed the total for the whole of last season and the total for the season is expected to be between 8,000 and 9,000 bales.

37. The method of grading cotton has been under investigation this year. In the previous season the grading standards were much higher than those demanded by the market and attempts are now being made to bring our grading standards and market requirements into closer relations. The difficulty is over such points as what is a stained lock and what not stained, what is immature cotton and what not. In these matters our pass standards have hitherto been too severe. Adjustments in classification of stained and immature locks have been tried this year, but our experience shows that these adjustments do not yet meet the case. Our current season's experience, however, will be used as a basis for further experimental adjustments.

38. The demand for seed for planting last year was the biggest since the introduction of Improved Ishan and it was necessary to distribute a great deal of seed from the general crop. This was by no means free from native seed. An equally big if not greater demand for seed is expected this year and certain changes are being made in our multiplication scheme to ensure a bigger supply of pure Ishan seed in the future.

Green Manuring in the Southern Provinces.

39. Hitherto little success has attended our many efforts to arouse interest in green manuring among the farmers of the Western Provinces. In the last few years demonstration plots have been laid down at schools and elsewhere, and a few farmers have planted green manure crops under our advice and guidance. But these farmers, in spite of frequent visits and supervision from the Department, have generally not given the green manure crops enough attention to achieve success. When their trials seemed successful and were admitted to be so by the farmers themselves, they have always soon lost interest and given up the system, with no real explanation of why they did so. In the Oyo Province, however, the position shows more promise this year, particularly in the neighbourhood of Ogbomosho. In this district the land has

become thoroughly impoverished through continual burning, clearing and farming. The people fully realise that their land is deteriorating and that they have to go further and further away from the town to find land fertile enough to grow their food crops; they have therefore readily listened to advice about this matter and many are eager to give green manuring a trial.

40. In order to ensure as far as possible the success of this first attempt at green manuring at Ogbomosho, we are confining our attention to about sixty farmers. Each farmer has planted an area in accordance with our advice, to be cropped on the lines of a rotation including green manures (Mucuna and Popondo). There would be no difficulty in getting many more farmers in this area to start green manuring at once; but it is not advisable to allow more to start than we can adequately supervise, at any rate for the first season. Smaller numbers of farmers are starting similar rotations of crops under our guidance at Oyo and in the neighbourhood of Eruwa. It is evident from the above that, in spite of the lack of interest in the subject, which has been so apparent in past years, there are now some prospects of a future for green manuring in this part of the country.

41. In the Eastern Provinces, the past year's experimental work on our farms has confirmed our opinion that Calopogonium is capable of maintaining the fertility of land under continuous cropping, provided that the land is in fairly good heart when continuous cropping is begun, and provided also that it is never thereafter allowed to lie bare and exposed to wash. Tephrosia has been found to be very slow in its early growth and to be intolerant of any shade, even of that of a maize crop. In view of the further difficulty of devising a satisfactory field management of such a shrubby perennial, it has been decided that Tephrosia is unsuitable for incorporation in a crop rotation. But Tephrosia will grow on any except the poorest and most exhausted soil, and it is believed that it will be possible to use Tephrosia, grown for two or three years, to improve exhausted soils, excepting only the very poorest of them. This point requires continued investigation. Green manure trials are also being made on very poor land, in co-operation with local farmers in Owerri Province, on plots which they have lent to us for the purpose. These " badland trials " have yielded rather conflicting results. But one point now seems fairly clear, namely that no green manure plants will form a cover on the very worst soils. To restore fertility to these, the only method is to plant them up with the shrub known as " Echeku " (as is done by the farmers themselves in some districts) and to leave them thus for a long period of years.

42. There are some relatively good soils in the Eastern Provinces on which Mucuna flourishes, and on these it seems possible that we can apply the green manuring cropping systems which have been proved at Ibadan. Very promising results have been obtained from the Mucuna experiments on Onitsha farm. Trial plots to test the growth of Mucuna and other green manures have been laid down elsewhere in that province, and it appears possible that at least in parts of the Northern half of the province, mucuna will grow successfully. Further work and experience is required in this matter.

43. The Agricultural Chemist at Ibadan has co-operated closely in all this work, and his work has been very valuable both in suggesting lines for field experiments and in subsequently interpreting their results. His investigations show that Mucuna is

very susceptible to soil acidity, and that when the Ph figure of the soil is below 5 Mucuna will not grow. Whether this is due directly to the acidity or to the lack of mineral plant food that accompanies the acidity, is not altogether clear. Applications of lime to a very acid soil at Umuahia increased the growth of Mucuna and of the subsequent maize crop. Heavy dressings of lime produced no greater increases than light ones, and the Mucuna never attained the growth that occurs in the Western Provinces, where the soil is less acid. The maize yield was still less than half that obtained at Moor Plantation, even where the effect of liming had produced a 100% increase over the unlimed controls. With Calopogonium, while very small dressings of lime had no particular action, anything over half a ton per acre had a clearly depressing effect, proportionate to the amount applied. The soil was found to be still slightly acid after a dressing of one ton of lime per acre.

44. From soil analyses, it was found that these Owerri soils contain very little available phosphorus, and it was therefore surmised that dressings of ground rock phosphate might conceivably have some effect in increasing the fertility of these soils. The experiments have as yet been limited to the growth of Mucuna and Tamba (a Northern millet) in pots filled with soil from Umuahia. The results are interesting in that, while the rock phosphate had no effect when applied directly to the grain crop, yet when it was applied to Mucuna grown for green manure, its effect was remarkable both on the Mucuna and on the subsequent grain crop. Field experiments are now being undertaken at Umuahia on these lines.

Cultivated Oil Palms.

45. The following figures show the total area of small plantations made and maintained to the end of each year since this work was started. The figures include the small acreage of old groves that have been replanted, but do not include the very few larger plantations made by European Planters. The increase between the end of one year and the end of the next represents the area planted during the year, less a few old plantations which have been so badly neglected that they have to be struck off our lists of supervised plots. All the plots included in the statistics below have been planted in strict accordance with the departmental instructions and are regularly inspected at least two or three times a year by officers or native officials of the Department or by officials paid by the local Native Administration working under the instructions of the Agricultural Officer. In addition to the plantations thus made under departmental advice, there is also a very small number of similar, but mostly as yet very inferior, plots which have been planted by native farmers quite independently of us.

Cultivated Oil Palm Plots in Native Ownership.

	Total number of Owners.	Total area Acres.
On December 31st, 1928 ...	6	21
,, ,, ,, 1929 ...	27	119
,, ,, ,, 1930 ...	53	236
,, ,, ,, 1931 ...	85	352
,, ,, ,, 1932 ...	218	691
,, ,, ,, 1933 ...	382	1,014
,, ,, ,, 1934 ...	704	1,457
,, ,, ,, 1935 ...	1,382	2,498

The extent of the progess in each province during the year can be judged from the following table :—

Province.	Total at December 31st, 1934—Acres.	Total at December 31st, 1935—Acres.
Colony	3	3
Abeokuta	11	22
Ijebu	1	4
Oyo	32	47
Benin	820	1,383
Warri	51	89
Onitsha	101	216
Owerri	207	412
Calabar	226	311
Ogoja	5	11
Total	1,457	2,498

There is a slight discrepancy between the figures for 1934 as now given and those given in my last annual report; this is due to the omission, from the figures above, of the plots established by schools. These plots now number seventy-three with a total area of eighty-five acres, and, since their number is increasing annually, it seems now to be desirable to classify them separately from the ordinary farmers' plots.

46. It will be seen from the tables above that over 1,000 acres have been planted during the year, whereas in 1934, 450 acres were planted and in 1933, 300 acres. The rate of annual progress is thus increasing relatively fast, though we shall not regard it as satisfactory until it reaches 10,000 acres per annum. For even at that rate it will take many years to raise our whole oil palm industry from one of the gathering of wild produce to the status of a cultivated crop. The great handicap to progress is still the difficulty arising from native customs of land tenure, which can only gradually be overcome; but there are also still many districts in which, in addition to this unavoidable difficulty, we are hampered by the old unreasonable suspicion that Government wishes to encourage the planting of palms by farmers in preparation for seizing their land. Foolish as that idea seems to us, it dies slowly.

47. Planting during 1935 was also most unfortunately hindered by our well meant effort to supply intending planters with seedlings raised from seed of superior types of palm. The technical difficulties in the organisation of such a supply are considerable; and we had not last year, and have not yet, enough seedlings to meet all the demands that arose for them, as soon as they were offered for sale at a reasonable price. Many men who were intending to plant in 1935 decided that they would rather wait until 1936 for " selected seedlings ", rather than plant ordinary wild seedlings. Our chief difficulty in this work arises from the fact that, as yet, the area of planted palms of superior types on the department's farms is too small to supply seed to meet more than a very small part of the demand for seedlings. When, therefore, all the Native Administrations established nurseries at our request, for the production of seedlings, we had to ask the United Africa Company to supply us with thin-shelled seed from their plantation at Ndian in the Cameroons. The company kindly supplied half a million nuts free of charge. But the nuts of the oil palm germinate very slowly and irregularly under any circumstances: a germination of 25% or 30% in the first six months has to be regarded as satisfactory, and the remainder will germinate only gradually after an interval of years. But even 25% of germination seldom

occurs except with quite fresh nuts. When the nuts have to be transported from the Cameroons to various parts of Southern Nigeria, so that they cannot be planted until three or four weeks after the removal of the pulp, then only a very few indeed will germinate quickly. Not only in Nigeria, but also in Sumatra and Malaya, many forms of treatment of the nuts have been tried in the endeavour to improve and hasten germination and we are still continuing with such trials; but no one has yet discovered a method which will ensure a high percentage of germination in a reasonable period. The 1934 supply of seedlings was further greatly reduced by the depredations of an ant, which attacks the young plant immediately it emerges from the nut. This difficulty has now been overcome by the use of germinating trays made of corrugated iron, raised off the ground. As a result of all these difficulties a total of only 16,000 selected seedlings, sufficient for 265 acres, could be supplied in 1935, as against a total of 205 acres planted with such seedlings in 1932, 1933 and 1934. For 1936 we have seedlings ready in sufficient quantity to plant some 500-600 acres. We have also already a rather larger quantity of young seedlings which will be ready for 1937, and are hoping to germinate enough in the current year to provide a very much bigger supply in 1938. By that date the supply of seed from our own palms of superior parentage will be great enough to render this work much easier, and we hope thereafter to have, every year, really adequate supplies for farmers in all districts.

Palm Oil Presses.

48. In this matter again progress, though still slow, has been much more rapid than in any earlier year, as is shown by the following table :—

Palm Presses bought by Native Owners.

	Culley, Massa, etc.	Large Duchscher.	Small Duchscher.	Total.
At December 31st, 1932	44	9	5	58
„ December 31st, 1933	44	22	10	76
„ December 31st, 1934	50	37	13	100
„ December 31st, 1935	57	84	39	180

49. Progress during 1935 in each province is shown by the following table :—

	At December 31st, 1933.	At December 31st, 1934.	At December 31st, 1935.
Colony	—	1	1
Oyo	4	5	5
Benin	9	10	17
Onitsha	24	40	76
Ogoja	—	—	1
Owerri	14	16	22
Calabar	25	28	58
Total	76	100	180

The differences in the annual figures represent nett increases, *i.e.*, the number of presses bought during the year, less the small number that had worn out or gone out of use for any other reason during the year.

50. There was thus an increase of eighty presses during 1935, as against twenty-four in 1934 and eighteen in 1933. Of the presses now in use, over 100 are situated in two small parts of the country, one around Newi in Onitsha Province and the other near Akpabuyo in Calabar Province. These two areas together cover a total of something like 300 or perhaps 400 square miles. It appears that the saturation point has not yet been reached in either of these two small areas, for about a score more presses have already been sold or ordered in each of them during the first few weeks of 1936. The position is thus that in these two small areas, which do not seem to possess any very special natural advantages, the people have now really appreciated the great profit which they can derive from pressing their fruit instead of following their old methods, and they have now modified their domestic economy and social customs to fit in with the use of the press. Elsewhere, the stage reached as yet is only that of a few exceptionally enterprising individuals trying the new method somewhat tentatively; and in many parts even this stage is not yet reached, and we are still at the stage of giving demonstrations with little or no immediate result. If the press is profitable enough, and well enough suited to the natives' requirements, to be taken up to the extent that it has been in these two small areas, it would seem that it must eventually be similarly adopted in many other districts.

51. The firm which holds the agency for the Duchscher press assisted us this year by making a contract to buy 100 presses and thereby obtaining a small discount which was passed on to the buyer. The allowances made by that firm to cover its overhead charges and profit are, moreover, reasonable. But some of the local agents in Nigeria are still unduly cautious in their indents for stocks of presses, with the result that prospective buyers frequently have to wait two months or more, after they have paid a deposit, before they can be supplied with a press—an arrangement which, even if it does not hinder, does not encourage rapid progress. The Native Administrations, especially those of Onitsha and Calabar Provinces, have helped us greatly in this matter, by financing the sale of the machines on hire purchase terms. The Cultivated Oil Palm Ordinance, by providing for a rebate of the export tax to those owners of plantations who use a press for extracting the oil from their fruit, may be expected to have a considerable effect in encouraging the use of the press in a few years' time, as soon as an appreciable area of planted palms comes into bearing. The Registrar of Co-operative Societies is investigating the opportunities for the formation of co-operative societies for the sale of palm oil by existing press owners, or for the purchase of a press by a group of neighbours.

Export of Oranges.

52. In 1932-33, eight cases of oranges were shipped by the department to the Nigerian Cold Storage Company at Liverpool, which kindly undertook to sell them for us, in order to test the possibility of an export trade. The fruit was bought in the ordinary open market, in order that it might be liable to such careless picking and handling as may affect ordinary native produced oranges.. Our oranges were, however, carefully selected, graded and packed for shipment. At almost exactly the same date, a native exporter sent home thirty-nine cases of oranges, which he considered he had selected and packed carefully, though the work was done without our supervision. The results of the two shipments were in very marked contrast and served to prove

quite conclusively that, while the export of oranges might quite possibly prove profitable on a commercial scale if the inspection, grading and packing were all carried out under the strict supervision of the department, it was quite certain that any attempts by native exporters to ship without effective official control would only result in their selling at a loss, because of excessive wastage. But it was also clear that, even without any wastage, there could only be a profit if the various expenses could be substantially reduced. On being approached, the Public Works Department undertook to produce a packing-case as cheaply as possible, and the price of the locally-made cases, sold in small quantities, is now no greater than the lowest price at which cases can be imported in bulk. The Agricultural Department imported a small quantity of packing papers for sale to exporters in the very early stages, until they could be expected to buy their own papers. Messrs. Elder Dempster reduced their freight on oranges by 25%, and one of the Lagos Banks undertook to finance shipments by approved customers, on condition that shipment was made under the supervision of the Agricultural Department.

53. Under these conditions, seventy cases were exported in 1933-34 and 531 cases in 1934-35 (the twelve months period used in these fruit statistics is from August 1st to July 31st). The exporters, who at that stage included both Africans and European firms, obeyed our instructions reasonably well, although we had no powers of compulsion. But it was clearly in the exporter's interest that the regulation of the trade should be made compulsory. Regulations were therefore passed which came into operation on the 1st of October, 1935. In these regulations, we insist only upon reasonable quality, upon the fruit being at the correct stage of ripening, and upon proper grading and packing. The two pence per case which is charged for inspection was naturally unpopular at first, although it is not really seriously resented, because the exporters realise that the inspection is an absolute necessity if the trade is to be built up successfully. The figure of 2d. was considered to represent, in such a rough way as it is possible to estimate in the circumstances, the cost at which the inspection scheme for oranges could be made self-supporting, if the trade were upon a considerable commercial scale. Naturally it does not cover the cost of inspection at present while the trade is on a petty scale. It may seem a large charge to make for inspecting a quantity of fruit which only costs the exporter 10d. or so; but, on the other hand, it represents only about 2% of the final selling price of the fruit when it reaches the market in England.

54. During the season 1935-36, 1,709 cases were exported up to January 31st by five exporters. No European firm is now engaged in this trade, but the five exporters include three native firms which have been formed and registered locally for the special purpose of exporting fruit. Most of the fruit mentioned was exported during September, October and November, 1935 and during January, 1936. Guided by previous experience, and by the weekly broadcast wireless reports about the amounts of fruit on the sea *en route* for England, the Agricultural Officers at Abeokuta and Agege advised exporters to cease shipment at the end of November, as soon as it appeared that ample supplies would be reaching England from Spain and Palestine. All but one of the shippers acted upon this advice. The one who did not do so, lost heavily thereby. For his oranges, shipped in December, cost him over seven shillings per case to put on the market in London, and only fetched four shillings per case.

55. Some of the exporters are colouring their fruit artificially by the use of Ethylene gas; but it is not yet certain whether this is really profitable. It is to be hoped that it may prove not to be so. To an unprejudiced eye, a greenish-yellow colour, which is the best that can be obtained by this means, is not superior to the natural green colour of our fruit; and, moreover, the artificial colouring accentuates any blemishes on the skin of the orange, and, unless care is exercised, it may also lead to an increase of the wastage during shipment.

56. The exporters have helped us this season by showing us their " account sales " and reports upon their shipments, which they have received from England. The wastage has varied from nil to about 5% in different consignments. The highest price obtained for any consignment was 12s. per case, but the commonest prices were 9s. or 10s. per case. The following are typical figures of the average costs per case, on a shipment of about sixty cases :—

	s.	d.
Oranges (about 200)	0	10
Case	0	$9\frac{1}{2}$
Wrappers, hoop iron, nails, labour ...	0	$9\frac{1}{2}$
Inspection fees	0	2
Cost at railway station is thus	2	7
Rail to Lagos and harbour dues	0	6
F.O.B. cost thus amounts to	3	1
Steamer freight	2	1
Cost and freight thus amounts to ...	5	2
Rail Liverpool-London	0	10
Charges and Commissions	1	$8\frac{1}{2}$
Total cost and expenses are thus ... "	7	$8\frac{1}{2}$

These particular cases were sold in London, at prices ranging from 8s. to 9s. 6d., according to the count per case, for an average of 9s. $1\frac{1}{2}$d. per case, so that there was a clear " profit " to the exporter of 1s. 5d. per case; but it will be seen that this profit has to cover the exporter's overhead charges, so that the dividends derived from the trade will not be very great until it reaches a considerable scale, so that overhead charges can be reduced.

57. It will be noted that steamer freight constitutes more than one quarter of the total cost to the time of sale in London, and that the steamer freight, charges and commissions, altogether, amount to one-half of the total cost at the time of sale. It would seem probable that all these items might prove susceptible of reduction as soon as the trade is even a little bigger than it is at present. And if these expenses can be reduced somewhat, there seems little doubt that Nigeria could sell oranges in England at a lower price than any other country can sell them profitably. But in spite of the esteem in which they are held by Europeans resident here, these green oranges will always be regarded in Europe as an inferior type. The trade is thus essentially one in which we may hope to sell an inferior article cheaply. There is inevitably a grave danger inherent in this situation, because in any time of over-supply, an inferior, cheap grade may become unsaleable. There are, however, some factors to be set against this weakness in our position as orange exporters. One of these is the fact that the bulk of our fruit can be marketed in Europe

at a period of the year when such oranges as are available there are all very acid, while ours are ripe and sweet. Another is the fact that the extremely juicy nature of the Nigerian orange would seem to make it peculiarly well suited for a trade in expressed juice, if any firm would set up the very simple factory which would serve to test out the commercial prospects of such a trade. Lastly, the already large quantities of oranges that are sent by train from the Southern Provinces to the big native towns of the North, and the high prices at which they sell there, seem to suggest that the demand within the country can gradually absorb much bigger annual supplies of fruit than are produced at present.

58. After consideration of all these facts, it has been decided that the department should take the risk and responsibility of doing all it can to encourage and foster the commercial production of oranges. In addition to the assistance which we have been able to provide in regard to grading, packing and inspection, as already described, we have imported plants of a wide range of varieties of orange from several countries. The Agricultural Botanists at Ibadan have multiplied these by budding, and have instituted variety trials of all these scions, budded onto all the most promising stocks, at all our farms in the Southern Provinces. It is just possible that by this means we may find a variety which yields well locally and which produces fruit of a markedly higher quality than the present Nigerian green orange. But the apparently unsatisfactory results of earlier importations of orange trees indicate that a successful result of these efforts cannot be anticipated with any confidence. If they fail, we must continue with the present type, perhaps improved by the introduction of budding and by the multiplication, in this way, of the best type that can be picked out among the local seedling trees.

Grapefruit Growing for Export.

59. Importations of improved varieties of grapefruit trees into Nigeria have been made from time to time with the object of furnishing supplies of fresh fruit to augment and improve the rather scanty supplies of fruit available for local consumption. There is every indication that the present world consumption of fruit, particularly of citrus fruit, and still more particularly of grapefruit, will continue to expand. In Nigeria there are distinct possibilities for fruit growing for export if the grower can produce fruit that will be saleable in competition with other producing countries. An important point in this connection is that, so far as our knowledge and experience goes, oranges and grapefruit will grow well even on the poor sedimentary soils of the Eastern Provinces. Generally in Southern Nigeria and in the middle belt, excellent growth has been made by the earlier imported grapefruit trees and neither their cropping capacity nor the general quality of the fruit leaves anything to be desired. They seem satisfactorily free from serious insect or fungus attack. These earlier importations, however, are unsatisfactory from the point of view of the export market because they are seedy varieties, whereas the export market demands a seedless type. Apart from this one point everything seems to point to an export of grapefruit being more feasible than that of oranges, and what has just been said above indicates that an export trade even in oranges is a practical and profitable proposition.

60. A review of the known circumstances was made, and definite lines of work were mapped out, in 1932. Following up these lines of work, introductions of standard varieties of grapefruit trees (and other types of citrus as well) were made in 1933

from reputable horticultural firms in California and Florida, and also from or through the Departments of Agriculture in Trinidad, British Honduras and Sierra Leone. The existing grapefruit trees in the Southern Provinces, as far as they were known, were examined and the best of them were listed. Only one of these, at the American mission at Ogbomosho, produced a fruit that is really satisfactory from the point of view of a prospective export trade. It had been introduced from California in 1916 and has since been proved to be of the Marsh Seedless variety. This is the most popular variety of grapefruit for the export trade, and it was therefore decided to distribute only this variety to farmers who wished to plant for export. But good varieties of grapefruit trees must be propagated by budding or grafting, if we wish to get offspring which will all produce fruit of the same quality as that of the parent tree. Obviously for the export market, which demands certain minimum standards of quality, grading and packing, it is essential that we should start off with good and uniform trees. Accordingly plans were made, and work organised, to enable us to produce the maximum number of budded Marsh Seedless grapefruit trees from the Ogbomosho tree and from our newly imported plants; and also to increase the number of parent trees at Ibadan and our other farms in the Southern Provinces, so that we might be in a position, as early as possible, to supply all possible demands by growers (for export) with budded trees. This work has been pushed on rapidly; but owing to the fact that we have only a small number of young trees, *i.e.*, parent trees, to provide the buds which we require, we are limited in our efforts by their rate of growth. These trees are young and must be allowed to grow; and as taking buds from them involves the cutting off of growing branches, we have to be careful not to take too many at first. The scions used are sour orange seedlings raised from seed from local sour orange trees and there is no shortage of this seed. The seedlings require one and half to two years growth in the nursery before they are big enough for budding. After budding the budded plant requires to remain in the nursery for a further twelve or twenty-four months. We have, therefore, to make plans to meet the demand three and half years ahead. We cannot hope to make an accurate estimate of the demand we may expect so far ahead; but the situation seems to require that we should produce every budded plant that we can in the next few years, and provision is being made accordingly.

61. Budded Marsh Seedless plants are sold to approved growers (for export) at the reasonable price of one shilling per plant, and the following table shows the distribution to the end of 1935 :—

MARSH SEEDLESS GRAPEFRUIT PLANTING FOR EXPORT.

	1934.		1935.		Total.	
	Owners.	Trees.	Owners.	Trees.	Owners.	Trees.
Abeokuta... ...	2	40	34	232	36	272
Oyo	—	—	1	20	1	20
Colony	4	60	7	103	11	163
					48	455

Larger numbers of plants will of course be available for sale in the near future. We can at present supply only a small part of the demand.

62. A standard type of grapefruit for planting for export having thus been decided upon, and a start made to provide a supply of reliable planting material, the next step was to arrange for the registration of all farmers who wish to grow grapefruit for export. This has been done and we are keeping a list of all growers for export with a record of the number and date of planting of their trees, together with other details. Trees are only supplied at present to approved farmers after inspection of their land, and upon their agreeing to accept all our recommendations about methods of culture and marketing. With such close supervision of each successive step in the establishment of an export industry, we hope that when we reach the stage of beginning to ship fruit, we shall have a simple and straightforward task in establishing Nigerian grapefruit in the home markets and in building up the trade on a sound commercial basis. Regulations exactly similar to the Orange Export Regulations will be made in due course to provide for inspection and control of grading and packing. Our immediate work is to propagate the budded grapefruit plants in the numbers required to supply the needs of farmers.

Export of Pineapples.

63. The problem of avoiding excessive wastage in course of the shipments is not yet solved; but our experiments have now indicated hopeful lines of attack upon this difficulty. This year's work has proved that the fruit can be kept down to the small size required for export, by close planting in double rows. This same method of planting seems to effect immunity from both the black stem rot and the brown fruitlet rot, which cause much loss in uncultivated fruit after export. The avoidance of the third type of deterioration, which is apparently due merely to physiological breakdown, may perhaps be achieved by the use of shade.

64. In the early season crop, which normally extends from January to March inclusive, excellent results have generally been obtained from all shipments made up to the end of January. Thereafter, the fruit deteriorates rapidly and is often quite unfit for shipment at the time of harvesting. Account sales of early shipments have been kindly shown to us by various exporters. Fruits were bought locally this year at one penny each, which means 8d. or 10d. for the contents of a case. The freight and other expenses increase the total cost at London at time of sale, to much the same figure as that of a case of oranges (*see* paragraph 56 above), *i.e.*, somewhere around 7s. per case. Early shipments of pineapples sold at prices varying from 11s. to 16s. per case, with a nett profit, without allowing for overheads, of 5s. to 8s. per case. It is now quite clear that the chief cause of loss in unsatisfactory shipments in the past was simply the seasonal deterioration. There is little doubt that the deterioration is connected with dry weather for, on a certain date in February, 1936, the Agricultural Officer at Agege was able to pass pineapples at Agege as being likely to reach the English market in sound condition, while, on the same date, fruit at the same stage of ripeness, at places a few miles away, where there had been less rain, had all to be refused for export because of its internal condition. In spite of trials by various methods, it has not been found possible to increase very greatly the proportion of fruit that ripens before the end of January. Various methods of shading have been tried with promising, but, as yet incomplete, results. For while shading and close planting seem to avoid all the ills to which the casually grown pineapples of the native farmer are liable, these measures

introduce a new trouble in the shape of weak stems, so that the best system of shading will be a matter of some nicety which will have to be thoroughly investigated.

65. It would appear that fruit from the mid-season crop, which extends from May to June inclusive, if not immune, is little affected by any of the forms of rot or deterioration; for exporters state that their results from shipments at this season have been generally very satisfactory. In one instance, the selling price reached twenty shillings per case. It is, however, not possible, by any cultural methods yet tried, to cause a large proportion of the fruit to be produced at this season. It is also questionable whether this would be a satisfactory solution of the problem, even if it were possible. In most pineapple producing countries the main harvest seems to occur about the middle of the calendar year, and at that time soft fruits, such as strawberries and cherries, are also on the European market. The Nigerian main pineapple harvest, occurring in mid winter, represents a natural advantage which should be exploited if possible.

66. By our experiments, we are hoping to discover how the Nigerian peasant may produce, in the open field, pineapples of the same type and quality as the Azores grower produces under glass, with temperature, moisture and light all artificially controlled. It is thus naturally not an easy task that we have undertaken. But success would earn a valuable reward. The system of planting which the Agricultural Officer, Agege, has worked out necessitates the planting of 12,450 plants per acre. If all wastage after packing could be avoided, one penny per pineapple would be a very small price for the exporter to pay the grower; indeed the price would be almost certain to rise to two pence or threepence a fruit. (*See* figures quoted in paragraph 64 above and in paragraph 73 on page 27 of my Annual Report for 1933). But even at 1d. per fruit an acre of pineapples would yield £50 in a year. Thus, though the methods of pineapple culture which we eventually devise may well be laborious as compared to the culture of other local crops, that labour will still be light in relation to the financial return.

67. Although it would be most unwise to advocate any extensive cultivation on native farms until the outstanding difficulties have been satisfactorily overcome, it is nevertheless considered that a stage has been reached when the exploitation of the results we have so far obtained may be extended to a few farmers who are specially interested in the cultivation of pine-apples. Provided it is made clear that the recommendations we put forward must not be regarded as a final solution to the problems, but merely the results of our experience so far obtained, there should be no serious discouragement to such farmers if it is subsequently found necessary to modify the methods which we first advocate. Probably three farmers will be invited to take up pineapple cultivation on these conditions this year.

68. The following figures give the number of fruits exported by seasonal years (August 1st-July 31st) :—

1931-32	...	...	2,161
1932-33	...	...	1,260
1933-34	...	...	4,659
1934-35	...	...	2,705
1935-36	...	...	2,252 (to February 29th, 1936).

Rice Growing in Mangrove Swamps.

69. At the end of 1933, Mr. Glanville, an Agricultural Officer in Sierra Leone, was kindly permitted by his Government to come to Southern Nigeria to report on the possibility of our growing rice in our Mangrove swamps in the same way as has been done in Sierra Leone for many years. Mr. Glanville carried out his work very thoroughly and submitted an excellent report with a map showing a number of areas in our swamps which he considered to be suitable for rice growing. He was accompanied on his journeys in the creeks by the Agricultural Officer in charge of our station at Benin, so that the latter officer was able to learn much about this subject from Mr. Glanville.

70. The soils of the Mangrove swamps are so intensely acid that it seems hardly credible that any crop could grow on them. But the Sierra Leone experience shows that, where the right water conditions exist, rice succeeds remarkably well on these soils. The best conditions exist only in land bordering those middle reaches of the creeks where the water is quite fresh during the rainy season but is yet subject to the tidal rise and fall. The work of clearing of the mangroves, and the first hoeing of the ground, is very laborious, and a field will not yield a crop until the soil softens, that is until more than a year after clearing. In Sierra Leone, an interval of two years is often allowed between the clearing and the first crop; and even then the yield is not expected to reach its maximum figure for several years more. Thereafter, the land can be cultivated annually and will maintain its yield indefinitely without manuring. The yields of rice that can be obtained in this way are heavy. Puddling, which is normally a laborious operation in rice growing, and weeding, are both unnecessary, and the irrigation involves no labour. Thus heavy yields are obtained from this land in return for an amount of labour which, as rice growing goes, is very small indeed.

71. Mr. Glanville advised that the first experiment should be made at Warri, and the Native Administration at that place provided the funds for it. Accordingly, in 1934, one small plot near the rest-house at Warri was planted with rice. This particular piece of land happened to have been cleared some years earlier for the sake of sanitation. Two other plots, still covered with mangroves, were cleared and hoed in 1934 ready for planting in 1935. Experiments in time of planting have been conducted in both years and have shown conclusively that for good results the seed beds have to be planted in May so that the seedlings can be transplanted into the swamp fields in June. The yields from June transplanting in the rest-house swamp in 1934, were 2,671 lb. of paddy per acre from the softer portions of the land and 2,159 lb. per acre from the harder portions of the plot. Unfortunately, owing to bad work by an assistant, together with the lack of supervision which resulted from there being no Agricultural Officer at Benin for some weeks, the rest-house plot was not planted in 1935 until the end of August. Consequently the yield this year only amounted to 766 lb. of paddy per acre. The two new plots, cleared and hoed in 1934, were, however, planted in reasonably good time in 1935 and yielded 1,418 lb. of paddy per acre and 1,360 lb. per acre respectively. Since the yields of these plots, if properly cultivated, should increase steadily for several years, it seems clear that we can confidently expect yields at Warri of the same order as those that are obtained in Sierra Leone, where 2,000 lb. of paddy per acre is regarded as a fair average yield.

72. Eleven native farmers started rice growing at Warri in 1935 on very small plots which they cleared only at the end of 1934. Most of these men were too late with their sowing and transplanting to get as good yields as they would otherwise have done, but they are apparently not discouraged by their results, and further extension is anticipated in the near future. The wives of the native rice growers, like all beginners of this process, have found the work of extracting rice from paddy to be extremely slow and laborious. The department is, however, demonstrating the correct parboiling method, and, although we always find it more difficult to introduce any changes in matters in which women are concerned than in those affecting men only, yet no doubt the difficulty will be overcome in due course.

Tapioca and Starch.

73. Early in the year we were asked by one of the local exporting firms to investigate the possibility of exporting tapioca. So far as we have been able to ascertain, the art of making tapioca is known, in Nigeria, only to a very few " Brazilian " women living in Lagos. They buy peeled cassava roots from farmers and make flake tapioca for retail sale. They make a large percentage profit on a very small turnover. To make flake tapioca involves little more labour than to make a high grade of starch in the flour form, but it is an art which can only be acquired by practice. Attempts were made, by giving demonstrations, to interest farmers' wives around Agege in tapioca making, but it was soon apparent that, even if it were possible eventually to build up an export of that product, it would be a very slow and difficult piece of work. The firm was therefore requested to try exporting cassava starch in the form of flour. For the preparation of this product is widely known in many, though not all, of the Southern Provinces. It involves no nice judgment or art such as is needed in the making of tapioca. A trial shipment of one ton of starch flour was purchased with the help of the Agricultural Officer, Agege, at a price of 1½d. per pound, although it was realised that that might well be above the export value. This expectation proved to be right and, as soon as regular trade began, the price had to be reduced to £8 per ton at Lagos. Between November, 1935 and March, 1936, some 300 tons were purchased at this price, but so far (April) it has not all been sold and difficulty is apparently being experienced in marketing it. Provided that further experience shows that starch flour which is bought at this price can be sold profitably and readily on the open market in competition with other starch—as the exporters anticipate—then there seems no reason why this trade should not be greatly increased, with great benefit to the farmers of the country. Theoretically, the manufacture and export of tapioca should be more profitable; but the market for starch is believed to be very much wider than that for tapioca, and thus to be more suitable for this country to enter.

74. Investigations have also been made recently into the possibility of exporting dried pieces of peeled cassava roots. No trials of exporting starch had been made previously on a commercial scale. But the department had made trial shipments of peeled pieces some years ago. This latter had always previously been considered to be the more suitable trade for the Nigerian farmer. The reason for that opinion was the fact that to prepare a good, white grade of starch flour (or tapioca) necessitates an ample supply of very clean water. It had always been assumed

that the scarcity of such water in rural districts prohibited the production of starch on even such a scale as has already been attained this year. Peeled pieces merely need to be washed in a relatively small quantity of water and dried in the sun, so that they could be prepared everywhere. But this present attempt to export dried pieces seems likely to fail. The price offered, £3 10s. 0d. per ton, represents almost exactly the same return to the grower from a given weight of raw roots (£1 per ton) as he gets by making starch. In making starch he uses more labour, but he has the by-product fibre to compensate for that labour.

Poultry.

75. For many years the Department has kept Rhode Island Red fowls at Ibadan and sold eggs and surplus stock to farmers. The demand for both eggs and stock has always been more than we could meet, and the results of our efforts were visible in some villages, chiefly in the Oyo Province. There a proportion of village fowls have now some strain of the imported type in their constitution, and, where that is the case, the size of egg has been increased. The results were perhaps satisfactory in proportion to the effort made; and that small effort was all that was felt to be justified on such a sideline, until our more important lines of work were further advanced. But the effort was too small to have important results. It was recently decided that the time had come when we could afford to devote a little more attention to this poultry work, to put it onto a more satisfactory basis. This has been done by adopting the use of incubators and foster mothers to increase the supply of birds for sale, and by offering cockerels to villages or hamlets at the reduced price of five shillings each instead of seven shillings and sixpence, on the strict condition that all native cockerels were killed off before the English birds were bought from us, and that the village undertook to dispose of all cross-bred cockerels and to buy new pure-bred cockerels from us, for as many generations as we may find to be necessary and desirable. With the help of the Resident of Abeokuta, the first experiment of this kind was made at a hamlet near that town, and, after some early set-backs, it has proved more successful and popular than was originally anticipated. The same system is now being extended to other places and provinces, with every promise of success.

Co-operative Marketing of Cocoa.

76. The total numbers of active members, and the quantities of cocoa handled by all co-operative societies, including those in the Cameroons, during the last five years, have been as follows :—

Seasons.	*Members.*	*Tons of Cocoa.*
1931-32	1,710	724
1932-33	2,548	1,289
1933-34	4,877	1,608
1934-35	6,277	2,189
1935-36	6,143	3,127

77. The results in the last three years are given in more detail in the table below :—

Co-operative Sale of Fermented Cocoa.

	Oyo Province.	Ondo Province.	Cameroons.	Ijebu Province.	Abeokuta Province.	Totals or Average.
Total number of active members of societies:—						
1933-34 ...	1,859	995	1,833	190	Nil	4,877
1934-35 ...	2,266	826	2,480	179	526	6,277
1935-36 ...	3,127	875	2,141	...	188	6,143
Total quantity of cocoa sold, tons:—						
1933-34 ...	747	446	367	48	...	1,608
1934-35 ...	930	328	640	50	241	2,189
1935-36 ...	1,379	379	353	...	50	2,111
Total cash received:—	£	£	£	£	£	£
1933-34 ...	9,076	4,985	4,155	597	...	19,113
1934-35 ...	14,873	4,948	10,313	811	3,963	34,908
1935-36 ...	21,756	6,378	5,000*	...	853	33,987
Total reserves of societies:—	£	£	£	£	£	£
1933-34 ...	372	205	...	...	...	577
1934-35 ...	426	216	...	15	47	704
1935-36 ...	810	294	...	...	14	1,118

* Approximate.

78. Thirty societies sold cocoa through the Ibadan Cocoa Co-operative Marketing Union. 2,213 farmers took part in the sales, at which 912 tons were sold during the year, March 1st 1935 to February 29th 1936, as against 484 tons for the year 1934-35. The main cocoa season started late and was of short duration; but the crop was heavy. Sales were held twice weekly by the Union in Ibadan and as much as fifty-five tons was handled in one sale.

79. The quality of the cocoa sold by the co-operative Societies in Nigeria was very favourably reported on by the Inspectors of Produce and was well above the standard of ordinary Grade I. Unfortunately the premia obtained at sales were considerably lower than in past years. The Co-operative Officer visited most of the societies in Nigeria proper with the Agricultural Officers and, before the close of the season, took over the supervision of five societies in the Oyo Province on, or near, the Ijebu-Ode road. These societies disposed of their cocoa at the branch store of the Ibadan Union which was opened at Onipe, to avoid transport to Ibadan, and thus to obtain more favourable prices on account of the cheaper transport facilities to Lagos *via* Ejinrin.

80. The Cameroons societies have been hard hit this year by a severe attack of black pod disease, which resulted in the loss of between a quarter and one-half of their members' cocoa. They have also encountered difficulties owing to many buyers trading in wet cocoa, a practice which seems to be increasing rapidly. The co-operators, however, appear to have held together and are not discouraged. To meet these difficulties, measures have been devised which it is hoped will be in operation next season.

Produce Inspection.

81. The work of inspection of cocoa, palm oil and palm kernels has been continued with its usual efficiency. The effect of the work of the co-operative societies and of the cocoa grading,

which are complementary, in improving the quality of Nigerian cocoa is shown by the following statistics for the main crop in the Western Provinces, that is to say of all the cocoa graded there during the period October 1st to February 28th or 29th which weighed over 10½ ounces (11 oz. prior to 1935-36) per three hundred beans. The standards for grades II and III were changed in October 1st 1932, so figures for these grades are not given prior to that date. The standard for grade I has been constant since October 1st 1929.

Grading of Main Crop Cocoa—Western Provinces.

	Grade I.	Grade II.	Grade III.	Total Main Crop—Tons.
	%	%	%	
1929-30 ...	9	—	—	41,000
1930-31 ...	9	—	—	38,000
1931-32 ...	13	—	—	46,000
1932-33 ...	18	72	10	53,000
1933-34 ...	17	73	9	47,000
1934-35 ...	27.1	68.2	4.5	55,000
1935-36 ...	29.9	69.2	0.8	67,000

82. It will be seen that there has been an increase of 2.8% in the proportion of grade I. This is not a big increase, but it is to be noted that it has occurred in spite of a falling, and now very small, premium for grade I over grade II. The smallness of the premium for grade I is ascribed by all buyers to the high quality of Nigerian second grade cocoa, for while the official definition for that grade takes no account of the proportion of fermented beans, nearly every parcel of second grade cocoa is, in fact, partly fermented. All, except about 5% of these parcels, can be guaranteed to have a content of less than 35% of unfermented beans. Indeed second grade cocoa is regularly sold, against this limit, in the importing countries.

83. A slight change was made in the definition of light cocoa this season, after very full discussion with all parties in the cocoa trade. Light cocoa is now defined as cocoa of which 300 beans weigh less than ten and a half ounces, instead of eleven ounces as previously. The trade in England has now adopted, in respect of Nigerian cocoa, the practice of dealing with cocoa as either Main Crop or Light, according to our definition. This is altogether a more business-like and satisfactory arrangement than the ordinary trade method of defining cocoa as Main Crop or Mid-crop, according to the date on which it was bought by the exporters from middlemen, who might have had it in their possession for a period of hours or of months!

Appendices III and IV.

84. In accordance with instructions I give a summary of recent agricultural legislation in appendix No. III and of our last year's expenditure and revenue in Appendix No. IV.

O. T. FAULKNER,
Director of Agriculture.

Moor Plantation,
Ibadan,
9th June, 1936.

APPENDIX I.

Stock Breeding Policy.

1. When the work was started it was intended to work with three out of the five most distinct types of Zebu cattle in the country, keeping each breed distinct, and selecting within the breed. The object of the breeding was to be dual purpose, for milk and work. It was anticipated that eventually it would be possible to reduce the number of breeds maintained, and to work with the best one or two of them. It is considered that the time has now come when it is possible to reconsider the policy; and also that it is essential that we should now do so, because we cannot carry all the stock which we have now, or shall soon have. Shika now carries, in its two herds, about 150 cows and fifty heifers which have been served or will soon be fit to be served. This is, we consider, the suitable permanent size for a herd of one breed if satisfactory progressive improvement is to be made. This size of herd allows for the simultaneous use of from four to six bulls.

2. There is a general consensus of opinion in the Department that the bulls of the White Fulani and Godali breeds are markedly superior to the Shuwas, for work. After full consideration and discussion it has been decided as follows :—

White Fulanis to be kept pure, the herd to be maintained at about 150 head of cows, and the general breeding policy to remain as at present, though it is hoped that soon, when a number of young bulls from good cows are available, it will be possible to select among them, from the work point of view, more than has hitherto been possible. The selection to be made according to measurements, and the results of trials of young bulls at work. In this breed, the heaviest milking cows are almost invariably those of the biggest size and best conformation, so that selection of bulls for dual purpose (milk-inheritance and work) is usually easy. The two most important points of this breed are that the cows' udders are remarkably well shaped as compared to most Zebus; and that the best bulls are very satisfactory workers in every way. Further the " barrels " of the best animals are good. The best milk records of the White Fulanis are not quite so good as those of the best cows in the other herds; but, on the other hand, the proportion of good, as distinct from very good, milkers is high among the White Fulani cows. The worst faults of the breed, especially in poorer specimens, are that the height-length ratio tends to be low, and the bodies " shallow ". Points of the breed which are not yet known to be certainly either good or bad are level hind-quarters, and the fact that White Fulanis have not the large dewlap and loose folds of skin that are so prominent a feature of many Zebu breeds.

3. The Godali herd includes our best milkers, and also a high proportion of good milkers. As among the White Fulani cows, the biggest and best shaped cows are the best milkers. For work, the bulls and bullocks are, so far as can be judged at present, not quite so good as the White Fulani. Experience with them is, however, not yet very extensive; and it cannot yet be said that one or the other of these two breeds is unquestionably the better for work. Important differences between Godalis and White Fulanis are :—The Godalis are, on the whole, bigger and heavier, and the depth of body is greater. On the other hand, the udders are of poorer shape, and the ribs tend to be less well sprung. Important points of difference, which are not yet generally agreed to be good or bad, are the more sloping hind quarters of the Godali,

and their relatively big dewlaps and loose skin (though the latter is not extreme in comparison with some Indian breeds).

There is a discernible approximation in the best animals of the two breeds. Some of the best Godali cows (by record) have better udders than most of that breed, and the best milkers of both breeds seem to have moderately-sloping hindquarters. Even in minor points, a tendency to similarity appears in the best of each herd. Therefore, by breeding for the dual purpose of milk and work in both herds, we may quite likely approximate more and more to a very similar type in both herds; and thus, if any crossing or amalgamation of the Godali and White Fulani herds is ever to be done, it is considered that it would be better to postpone it for several generations.

4. Even if we were able to maintain three pedigree breeding herds, it is considered that it would not be worth while to try to evolve a good dual-purpose Shuwa herd. The reasons for this are :—

(*a*) In this type the best milkers are generally small cows, and the biggest cows are generally poor milkers. There are only a very few animals that are at all exceptional to this rule, and even they are only partially so. We have no cows, still less any strains, that are big and well shaped and also heavy milkers. In this matter, the state of affairs in the Shuwas is exactly the opposite to that in the other two breeds. This must make dual purpose improvement in the Shuwas very much slower and more difficult than in the other breeds.

(*b*) The Shuwa bulls have been found to be too small to make good workers; they are docile and willing, but there is some doubt whether they stand up well to hard work, and it is even questionable whether their small size alone accounts entirely for their poor ability as workers. They are not, like the Rahajis, valueless for work; but they are undoubtedly inferior to the White Fulanis and Godalis.

(*c*) Although many Shuwas are good milkers for their size, the proportion of outstandingly good milkers among the foundation cows was small. To-day the best Shuwa cows are not quite such good milkers as the best Godalis, and little or no better than the best White Fulani.

5. It has been decided that half of this herd should be graded to White Fulani by the continued use of White Fulani bulls, and half to Godali. This will enable the numbers to be kept down without difficulty to what Samaru can support. The grade culls from Samaru will be more valuable to farmers than pure Shuwas. Regard will be paid to milk quality in the culling, so that it is possible that after several generations, if some new blood is needed in the White Fulani and Godali herds at Shika, the Samaru herd may be able to supply it.

6. The Adar herd includes some very good milkers, and there is a large proportion of good milkers in that herd. But the original herd was too small in numbers, even of cows and still more of bulls. It is even questionable if the few bulls that we have been able to obtain are true to type, even to the degree that the cattle of the other breeds are true to their types. It has been decided to send this herd to Shika and to grade them to Godali. The present idea about this grading is, however, very slightly different to that about Shuwa grades at Samaru. For if the first Godali-Adar cross should appear to make a particularly good type, then it is considered that bulls of the first back cross (Adar x Godali x Godali) might be considered on their merits for stock bulls, just as though they had been " pure-bred " Godali.

APPENDIX II.

Measurement of Stock.

The following measurements will be taken

(*a*) Height—minimum behind shoulders.
(*b*) Length—from a line across the back between hindmost points of shoulder blades to hindmost of the two high vertebrae between the haunches.
(*c*) Height at haunches—maximum back between the haunches.
(*d*) Height at Pin-bones.
(*e*) Girth—minimum behind elbow.
(*f*) Width at shoulder.
(*g*) Width at haunches.

It will be noted that to take measurement (*f*) and (*g*) a simple form of calipers is desirable.

2. The following ratios will be calculated :—

(1) Height-length ratio	...	$a/b \times 100$
(2) Slope of back ...	...	$a/c \times 100$
(3) Slope of quarters ...	...	$d/c \times 100$
(4) Girth ratio	...	$e/a \times 100$
(5) Shoulder width ratio	...	$f/a \times 100$
(6) Haunch width ratio	...	$g/a \times 100$

It will be noted that the ratios are chosen in such a way that, so far as our present knowledge goes, a higher figure represents a conformation which is preferable to a lower figure. This seems to make for simplicity and for ease in remembering the system.

APPENDIX III.

Summary of Important Agricultural Legislation passed during the period April 1st, 1935 to March 31st, 1936.

1. Regulations No. 20 of 1935—The Orange Export Regulations—were made on 1st July, 1935, to come into force on 1st October, 1935. They provide for the compulsory inspection of oranges before they are packed for export, and for their inspection again when the boxes are being closed. Standard boxes and counts, with which exporters must comply, are defined in schedules appended to the regulations.

2. Regulations No. 25 of 1935.—The Cotton Marketing Regulations—were made on 22nd July, 1935, to come into force nominally at once, but in reality in the cotton season 1935-36. The regulations provide for the licensing of buyers in those parts of the Northern Provinces where American Cotton is grown for export. Two kinds of area are distinguished, those of more intensive production, which are called Market Areas, and those of less intensive production, which are called Buying Areas. The operations of an individual person engaged in buying cotton are restricted, during any particular buying season, to one market or, alternatively, to one buying area. In market areas, cotton may not be purchased elsewhere than in one of the central enclosed markets established for the purpose, and the cotton is graded before sale. A buyer in a buying area may buy ungraded cotton anywhere within that area, but must thereafter take the cotton directly to one of the markets, designated in his licence, to have it graded, before resale.

3. The Cultivated Oil Palm Ordinance, 1935, received the Governor's assent on June 6th, 1935 and the Regulations No. 24 of 1935—The Cultivated Oil Palm Regulations—were made under it on 22nd July, 1935, to come into force on 1st October, 1935. By

this legislation, provision is made for the repayment, under certain conditions, of part of the export duty on any palm oil of high quality which is produced from fruit harvested from planted oil palms. The concession cannot yet be extended to the Mandated Territory of the Cameroons, because the staff of the Agricultural Department in that province is as yet too small in numbers to be able to administer the regulations.

4. Regulations No. 4 of 1936.—The Importation of Plants Regulations—were made on 13th January, 1936, to come into force on 1st February, 1936. They provide for the prohibition of import of plant materials, or, alternatively, for their inspection by the Agricultural Department immediately after importation, in order to prevent the introduction of any pests or diseases of crops. Roughly it may be said that in accordance with these Regulations :—

(*a*) No plants, parts of plants, or seeds, may be imported under any circumstances whatever from the West Indies or Central or South America, excepting only by the Agricultural Department itself;

(*b*) Planting materials from tropical countries other than the West Indies, Central and South America, and West African countries, can be imported to Nigeria under certain conditions;

(*c*) Importations from other West African countries depend upon arrangements made between the countries;

(*d*) Seeds and planting materials originating from countries in the temperate zones can be imported freely.

5. Regulations No. 12 of 1936.—The Palm Oils, Palm Kernels and Cocoa (Inspection for Export) Regulations were made on 16th March, 1936, to come into force immediately. These Regulations amount only to a re-enactment, under one heading, of the original produce export regulations and the many amendments to them which had been passed from time to time.

APPENDIX IV.

STATEMENT OF THE EXPENDITURE UNDER HEAD 4, AGRICULTURE FOR THE FINANCIAL YEAR, 1935-36.

		£	s.	d.
	Personal Emoluments	48,215	4	0
	Less Reimbursements by Native Administrations	3,515	17	10
	Net Total, Main Branch	44,699	6	2
	Personal Emoluments, Produce Inspection ...	26,109	0	2
	Total, Personal Emoluments	70,808	6	4
	Other Charges, Annually Recurrent.	£	s.	d.
38.	Passages	2,873	17	8
39.	Transport, Monthly Allowance	448	18	2
40.	Transport, Mileage, Hire and Carriers ...	3,433	16	3
41.	Transport, Materials and Stores	65	13	5
42.	Transport; Railway	3,590	2	7
43.	Travelling Allowances	—		
44.	Telephones	149	2	4
45.	Stationery	149	4	4
46.	Contingencies	34	0	4
47.	Books and Periodicals	48	15	10
48.	Uniforms	7	17	0
49.	Artisans, Overseers and Pupils	500	17	2
50.	Labour	5,361	18	7
51.	Poultry Farms	38	18	0
	Carried forward	£16,703	1	8

		£	s.	d.
	Brought forward	£16,703	1	8
52.	Development of Cotton Industry	220	15	6
53.	Farming Equipment	822	1	2
54.	Rent and Compensation for Land acquired for Farms	1	16	0
55.	Upkeep of Laboratories	527	11	3
56.	Palm Oil Extension Work	736	6	10
57.	Cocoa Extension Work	92	12	4
58.	School Equipment	25	6	7
59.	Development of Fruit Trade	13	13	8
60.	Water Supply, Nassarawa Farm	16	7	0
61.	Hostel Charges for Agricultural Scholars ...	42	10	4
	Total	£19,202	2	4
	Less Reimbursements by Native Administrations	980	7	3
	Net Total, Other Charges, Main Branch ...	£18,221	15	1

	Produce Inspection.	£	s.	d.
65.	Passages	944	11	0
66.	Transport; Monthly Allowances	210	10	0
67.	Transport; Mileage, Hire and Carriers ...	1,350	12	8
68.	Transport; Materials and Stores	49	15	4
69.	Transport; Railway	446	19	6
70.	Travelling Allowances		—	
71.	Rent	45	0	0
72.	Seals and Presses	1,219	7	3
73.	Stationery	36	19	2
74.	Temporary Buildings	7	1	8
75.	Contingencies	32	0	2
76.	Bush Allowances	29	8	0
77.	Upkeep of Launch	817	13	5
78.	Telephones	136	17	11
79.	Produce Testing Apparatus	99	4	10
80.	Provident Fund, Bonus, etc.	702	15	1
80a.	Colonial Charges (including arrears from 1st April, 1926)	5,901	0	7
	Total Other Charges, Produce Inspection ...	£12,029	16	7

	Summary.			
	Personal Emoluments	70,808	6	4
	Other Charges	30,251	11	8
	Total	£101,059	18	0

	Special Expenditure.			
81.	Encouragement Oil Palm Plots		—	
82.	Locust Investigation in Chad Area	66	17	6
	Total	£66	17	6

Revenue 1935-36.

Head 2.—Fees of Court.

Item 14.	Sales, Agricultural Produce ...	£790	10	11

Head 8.—Produce Inspection.

Item 1.	Fees, Inspection	47,720	0	5
,, 2.	Fees, Overtime and Re-bagging ...	603	5	11
		£48,323	6	4